

were minutely detailed, and the different proportions of the toes characteristic of different species, especially of the two most gigantic, viz. the *Dinornis giganteus* of the North island, and the *Palapteryx robustus* of the turbary deposits of the Middle island. The adaptation of the claw-bones for scratching up the soil was obvious from their shape and strength. The generic distinction of *Palapteryx* had previously been indicated by a slight depression on the metatarsus, supposed by the author to be for the articulation of a small back-toe, as in the *Apteryx*; and he had since received a specimen of the principal bone of that toe, which was exhibited and described. A nearly entire sternum, a portion of a minute humerus, and a cranium of one of the smaller species of *Dinornis*, were also exhibited and described.

This magnificent series of remains of great New Zealand birds had been collected chiefly by the late Colonel Wakefield, and had been transmitted to the author through the kind interest of J. R. Gowen, Esq., a Director of the New Zealand Company.

March 12, 1850.

W. Spence, Esq., F.R.S., in the Chair.

The following papers were read:—

1. FIRST THOUGHTS ON A PHYSIOLOGICAL ARRANGEMENT OF BIRDS. BY EDWARD NEWMAN, F.L.S., F.Z.S. ETC.

The systematic arrangement of the Class Aves is more unsettled than that of any other portion of the animal kingdom, a circumstance that may fairly be attributed to our attaching too high a value to characters purely structural or admensural, while we neglect others more intimately connected with reproduction; in a word, to the substitution of physical for physiological characters. In mammals, reptiles and fishes, we have a primary division based entirely on physiology: thus mammals are placental or marsupial; reptiles are oviparous or spawning; fishes are viviparous or spawning; and this primary division of these classes is admitted by all physiologists to be strictly natural. Notwithstanding, however, the purely physiological character, on which these primary divisions depend, it is found that physical characters harmonise with physiological, and that intimate structure in each instance bears out physiological difference. It were not wise altogether to discard structural differences even in the outset of an inquiry into system, but it is necessary to use them rather as corroborative than as indicative; and above all to draw a distinct and permanent line between such as are truly intimate and such as are purely adaptive. It has always appeared to me that one of the chief advantages of an extensive Vivarium like that possessed by our Society is the opportunity it affords for studying animated nature in an ani-

mated state, for ascertaining physiological as well as physical characters. If then we avail ourselves of the opportunities which are or ought to be thus afforded us, we shall find that in the very outset of life a physiological character of the most obvious kind will divide birds into groups as distinct as are the placental and marsupial mammals, or the cartilaginous and bony fishes. Prior to the extrusion of the egg, observed facts bearing on this subject are so few and so unconnected that they cannot be rendered available as affording evidence on the question to be considered; it is therefore compulsory that our comparisons begin at that moment when the condition of the young becomes patent by the breaking of the shell. Commencing the inquiry at this point, which may safely be regarded as analogous to the birth of a placental animal, we have this obvious grand division of the class :—

1. *Hestogenous Birds*.—In these, immediately the shell is broken the chick makes its appearance in a state of adolescence rather than infancy: it is completely clothed, not with such feathers as it afterwards wears, but still with a close, compact, and warm covering: it possesses the senses of sight, hearing, smelling, &c. in perfection: it runs with ease and activity, moving from place to place at will: it perfectly understands the signals or sounds uttered by its parent, approaching her with alacrity when invited to partake of food she has discovered, or hiding itself under bushes, grass, or stones, when warned of danger; in either case exhibiting a perfect and immediate appreciation of its parent's meaning: it feeds itself, pecking its food from the surface of the earth or water, and not receiving it from the beak of its parent: although entering on life in this advanced state, it grows very slowly, and is long in arriving at maturity. When full-grown it uses its feet rather than its wings: it trusts much to its legs for means of escape: when it flies, it moves through the air by a series of rapid, powerful, laboured strokes of the wing, and invariably takes the earliest opportunity of settling on the land or water, not on trees; it never takes wing for recreation or food, but simply as a means of moving from place to place: it is polygamous in its habits; the number of females predominating over the males: the males are pugnacious, they accompany the females only until incubation has commenced, and abandon the duties of incubation and the care of the young solely to the females: the females make little or no nest, a depression scratched on the surface of the soil generally sufficing: the eggs are large in comparison to the size of the bird: neither sex sings, or attempts to imitate the voice of men or animals. Birds included in this division approach more nearly to mammals than do those which it excludes: for instance, the habitual use of land or water for progression, the swiftness of foot, the strength and muscular development of the legs, the polygamous habits, the want of the extraordinary instinct of nest-making, are characters which, while they seem to degrade these birds as birds, certainly raise them in the list of animals, because they are thus brought nearer those animals which suckle their young, and which are always placed at the head of the animal kingdom. In an econo-

mical point of view, and considered in reference to man, the flesh of these birds is wholesome, nutritious, and is generally considered highly palatable. The division comprises the following orders, in each of which partial exceptions to one or other of these general characters occur :—

1. Gallinæ, or the Poultry order.
2. Brevipennes (*Cuvier*), or the Ostriches.
3. Pressirostres (*Cuvier*), or the Plovers.
4. Longirostres (*Cuvier*), or the Snipes.
5. Macroductyli (*Cuvier*), or the Rails.
6. Plongeurs (*Cuvier*), or the Divers.
7. Lamellirostres (*Cuvier*), or the Ducks.

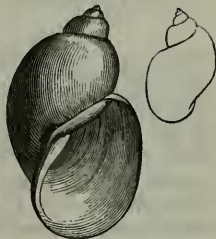
2. *Gymnogenous Birds*.—In these, when the shell is broken, the chick makes its appearance in a state of helpless infancy : it is naked, blind, and incapable of locomotion : it cannot distinguish its parent by means of its senses : it gapes for food, but does not distinguish between proper food offered by its parent, and a stick or a finger held over it : it cannot feed itself, and would die were not food placed in its mouth : it rapidly attains its full size, often before leaving the nest. When full-grown it uses its wings rather than its feet : it flies with a succession of deliberate and easy strokes : it takes wing for recreation and for food, and not merely for the purpose of moving from place to place : it is strictly monogamous ; the sexes being equal in number : males share with females the cares of incubation and feeding the young until these are able to shift for themselves. Birds possessing these characters build elaborate nests in trees, and perch in trees rather than on the ground : many of them sing melodiously ; others imitate, with wonderful facility, the voice of man or of animals. As an economical character in connexion with man, their flesh is bitter and unpalatable, often offensive and disgusting ; hence man has never domesticated them for purposes of food. These are birds *par excellence* : they possess in perfection the essential characters of birds : in the habitual use of air for progression and of trees for resting, in the want of abilities for terrestrial progression, in strength and bulk of pectoral muscle, in monogamous habits, in the fabrication of nests, in power of song, they are raised as birds, but degraded as animals, since in all these characters they recede from those animals which suckle their young. The division comprises the following groups, in each of which exceptions to one or other of the general characters occur :—

1. Totipalmes (*Cuvier*), or the Pelicans.
2. Longipennes (*Cuvier*), or the Gulls.
3. Accipitres, or the Birds of Prey.
4. Cultrirostres (*Cuvier*), or the Herons.
5. Passeres, or the Sparrow order.
6. Grimpeurs (*Cuvier*), or the Climbing birds ; and
7. Columbæ, or the Pigeons.

2. ON A NEW SPECIES OF *LYMNÆA* FROM THIBET.

BY LOVELL REEVE, F.L.S., F.Z.S. ETC.

LYMNÆA HOOKERI. *Lymn. testâ ovatâ, tenuiculâ, conspicuè umbilicatâ, anfractibus quatuor ad quinque, convexis, supernè depresso-rotundatis, suturis subimpressis, aperturâ orbiculari-ovatâ, marginibus laminae latiusculâ subverticali conjunctis; sordidè olivaceo-fusca.*



The above-described freshwater mollusk, collected by Dr. Hooker on the Thibetian or north side of Sikkim Himalaya, at 18,000 feet elevation, belongs to the same type as our well-known *Lymnæa peregra*, and affords an interesting addition to the evidence which has been in part collected touching the wide geographical distribution of corresponding forms of plants and animals over those parts of Europe and Asia where there are no extensive mountain-barriers. The European *Lymnæa stagnalis* has been collected as far east as Affghanistan, and the typical form of *Lymnæa peregra* is very characteristic in this species from Thibet. A depression of the whorls next the sutures, which gives a more orbicular form to the aperture, and a conspicuous umbilicus, which is not in any degree covered by the columellar lamina, prove it to be specifically distinct from *L. peregra*; and these characters do not appear in the various modifications of that species arising out of its more or less ventricose growth, or more or less attenuated convolution. South of the Himalaya range, where Dr. Hooker reckons the snow-line to be 5000 feet lower than on the north side, and 3000 feet lower than the locality inhabited by this species, the *Lymnææ* are of quite a different type, more especially in the plains of Bengal, where the shell, owing to its being formed in so much warmer a temperature, is of stouter growth, and characterized by some design of colouring. The European types of *Lymnæa*, ranging over Russia and Siberia, appear abundantly in the stagnant waters of North America; and some are identical in species. *L. elodes* of Say, inhabiting Pennsylvania, is doubtless the same species as the European *L. palustris*; *L. truncatula* of the same author appears to be identical with *L. desidiosa*; and the *L. peregra*, represented by *L. Hookeri* in Thibet, is represented in Pennsylvania by Say's *L. catascopium*. The *Lymnææ* of Australia are of a remarkable and very distinct type from either of those mentioned above.

I have much pleasure in naming this Thibetian *Lymnæa* after the indefatigable traveller, whose researches into the natural and physical history of that remote country into which few have penetrated, are likely to be attended with such important results. I have placed the specimens in the British Museum.

The figure in outline is of the natural size.

No. CCIV.—PROCEEDINGS OF THE ZOOLOGICAL SOCIETY.

3. ON THE ANIMAL OF LIOTIA; WITH DESCRIPTIONS OF NEW SPECIES OF DELPHINULA AND LIOTIA, FROM THE CUMINGIAN COLLECTION. BY ARTHUR ADAMS, R.N., F.L.S. ETC.

(Mollusca, Pl. VIII. fig. 18, 19, 20.)

An examination of the animal of *Liotia Peronii* tends to confirm the generic importance of a small group hitherto confounded with *Cyclostrema* and *Delphinula*, but which had been justly recognised by Mr. Gray under the name of *Liotia*. The shell is known by its thickened peritreme; the operculum is peculiar, and the habits are chiefly littoral. In *Liotia* the head is probosciform, the tentacles subulate, the eyes on conspicuous peduncles at their outer bases; there are no intertentacular lobes, but a conical lobe on each side of the head external to the eye-peduncles; the lateral membrane of the foot is undulated, and furnished posteriorly with three cirrhi.

The operculum is arctispiral, the volutions being very narrow, numerous, and covered with a calcareous deposit, which is articulated at regular intervals, giving the upper surface of the operculum a tessellated appearance; the periphery is ornamented with radiating, horny fibres.

LIOTIA PULCHERRIMA, Adams. *L. testâ subdiscoïdæ; spirâ elevatiusculâ, anfractibus rotundatis, liris transversis et longitudinalibus elegantissimè cancellatâ, liris transversis muricatis; labro expanso, duplicati, radiatim fimbriato; umbilico per-amplio, crenulato.*

Hab. apud Promontorium Bonæ Spei. (Mollusca, Pl. VIII. fig. 21.)

Shell subdiscoïd; spire slightly elevated, whorls rounded, very elegantly cancellated with transverse and longitudinal raised ridges, the transverse being muricated; outer lip expanded, with a double peritreme, each being radiately fimbriated; umbilicus very large, the margins crenulated.

Hab. Cape of Good Hope. (Mus. Cuming.)

LIOTIA AFFINIS, Adams. *L. testâ globosâ; spirâ subprominulâ, anfractibus rotundatis, transversim elevato-striatis, costis variciformibus longitudinalibus, distantibus, angulatis, mucronatis; anfractuum parte inferiori serie unid foraminum; labro expanso; umbilico patulo, crenulato.*

Hab. in littoribus Australiæ.

Shell globose; spire rather prominent, whorls rounded, transversely elevately striated, with variciform longitudinal ribs, wide apart, angulated, and with the angles furnished with sharp points; lower part of the whorls with a single row of holes; outer lip expanded; umbilicus wide, crenulated.

Hab. Australia. (Mus. Cuming.)

A species partaking of the characters of *L. scalarioides* and *L. varicosa* of Reeve, but which can be referred to neither.

LIOTIA DUPLICATA, Adams. *L. testá orbiculari; spirá depressá, anfractibus transversim et longitudinaliter costatis; costis transversis duabus, tuberculatis; anfractuum parte inferiori planá; umbilico amplo, perspectivo, crenulato.*

Hab. in insulis Philippinis.

Shell orbicular; spire depressed, whorls transversely and longitudinally ribbed; transverse ribs two, tuberculated; the lower part of the whorls smooth; umbilicus very large, the other whorls visible within, margin crenulated.

Hab. Cagayan, province of Misamis, Isle of Mindanao, Philippines. (Mus. Cuming.)

LIOTIA NODULOSA, A. Adams. *L. testá orbiculato-depressá; spirá complanatá, transversim striatá, ultimo anfractu costis transversis duabus in medio puncto sulcatis et nodulis magnis subdistantibus instructis, infra serie punctorum circa regionem umbilicalem; aperturá orbiculari, peristomate reflexo puncto fimbriato, umbilico patulo margine crenulato.*

Hab. in insulis Philippinis. (Mus. Cuming.)

DELPHINULA CORONATA, Adams. *D. testá subdiscoideá, albá, nigro lineatá; anfractibus rotundatis, supra, spinis squamæformibus subramosis nigricantibus sursum curvatis coronatá; anfractuum parte alterá spinis brevioribus nigris in seriebus dispositis; spirá plano-convexá.*

Hab. in littoribus Australiæ.

Shell subdiscoïd, white, with black lines; whorls rounded, coronated above with blackish subramose scale-like spines curved upwards, the other part of the whorls with shorter black spines arranged in parallel rows; spire plano-convex.

Hab. Cape Upstart, North Australia, in crevices of rocks at low water; Jukes. (Mus. Cuming.)

DELPHINULA EURACANTHA, Adams. *D. testá subdiscoideá, albidá fusco rubroque variegatá, anfractibus supra lævigatis, superne angulatis, angulo spinis squamæformibus grandibus latis decurvatis ornato; anfractuum parte inferiori serie uná spinarum et squamarum in seriebus parallelis dispositis ornato; umbilico amplo, squamis muricatis armato, peronophalo nodoso.*

Hab. in insulis Philippinis.

Shell subdiscoïd, whitish varied with red and brown; whorls smooth above, angulated superiorly, the angle ornamented with large wide decurved scale-like spines; lower part of the whorl with a single series of spines and numerous parallel rows of scales; umbilicus wide, armed with muricated spines, margin nodose.

Hab. Isle of Mindora, Philippine Islands; H. C. (Mus. Cum.)

Like *D. aculeata*, Reeve; but the spinose processes are broad and deflexed, and there is a single row of large spines on the under part.

DELPHINULA CALCAR, Adams. *D. testá orbiculari, discoideá; spirá depressá, albá, anfractibus angulatis acutis, peripheriá serie uná spinarum radiatim stellatá, spinis triangularibus*

compressis prominentibus ; anfractuum parte inferiore pland ; umbilico patulo, crenulato.

Hab. in insulis Philippinis.

Shell orbicular, discoid ; spire depressed, white, whorls sharply angulated, periphery with a single series of prominent broad triangular compressed spines radiately disposed ; lower part of whorls smooth ; umbilicus wide, crenulated.

Hab. Catanuan, province of Tayabas, island of Luzon, sandy mud, 10 fathoms ; *H. C.* (Mus. Cuming.)

A small species, partaking somewhat of the characters of *D. stellaris*, Adams and Reeve, but much more depressed, and the lower part of the whorls simple.

March 26, 1850.

W. Yarrell, Esq., V.P., in the Chair.

The following papers were read :—

1. ON A LEECH NEW TO THE BRITISH FAUNA.

BY J. E. GRAY, ESQ., F.R.S.

Mr. Hoffmann lately sent to the Zoological Gardens a living specimen of a very large leech which he had found near his house in the Regent's Park. It has been preserved in fluid, and now forms part of the Collection of British Animals in the British Museum.

It proved to be an adult specimen of *Trochetia subviridis*, Dutrochet (*Lamk. Hist. A. s. F.* v. 523), well-figured in the 2nd edition of Moquin-Tandon's 'Monograph of Hirudines,' t. 4. It is a very interesting addition to the fauna. It is the giant of the family, this specimen being more than 7 inches long.

2. ON THE OCCURRENCE OF REGALECUS GLESNE AT REDCAR, YORKSHIRE, IN 1850. BY J. E. GRAY, ESQ., F.R.S.

A specimen of this fish was cast ashore on Redcar Sands, Yorkshire, on Thursday, the 3rd of January 1850. "The fish was alive when found. Length without the tail-fin, which is wanting, about 11 feet ; width at the broadest part, 12 inches ; weight, 4 stone 10 lbs."

It was salted and exhibited at Redcar. During the exhibition the rays of the dorsal and ventral fins were almost entirely destroyed, and it broke transversely into three nearly equal lengths on being moved from the sand.

It was eventually sent to London, and now forms part of the Collection of British Animals in the British Museum. The specimen, when it arrived in London, agreed in general appearance and in all essential characters with the specimen from Cullercoats which was exhibited in London last year. Mr. Wrightson, who had the care of it at Redcar, considered, because it had no expanded forked tail, that the tail was wanting.